



ISTEP+: Grade 4

Mathematics

Released Part 1 Applied Skills (open-ended) Items
and Scoring Notes

Introduction

The *ISTEP+* Spring 2016 test was administered to Indiana students in Grades 3-8 and 10. The test included two parts: Part 1 was given in March, and Part 2 took place in late April and early May. Part 1 contained Applied Skills test questions (also referred to as open-ended items) that were hand scored by trained evaluators, and Part 2 was machine scored. Scores for Part 1 and Part 2 are combined to generate a student's total score.

Test results, as well as images of the Applied Skills student responses, are available online, and schools are expected to discuss results with parents and students. As a springboard for these conversations and to serve as a resource for teachers, the Indiana Department of Education has created this document, which consists of the following:

- a brief description of the types of questions on the test
- a short summary of scoring rules utilized by the trained evaluators
- a copy of the rubrics—or scoring guides—used by evaluators to score student responses
- a copy of the released Applied Skills questions (*“released” means the items are posted on the web and are no longer secure; therefore, the released test items can be discussed and used with students as future practice items*)
- anchor papers—or sample student responses—used by evaluators to distinguish between score points

Notes:

- The Part 1 open-ended questions are released when test results are made available.
- It is important to keep in mind that the majority of a student's score is calculated from items in Part 2. Since Part 2 items are secure and are not released, they are not included in this document.

Question Types

This document addresses questions from *ISTEP+ Part 1*. *Students* demonstrate their knowledge and understanding by responding to items that are open-ended, providing written responses in a short-answer or essay-type format.

Part 1 consists of the following test question types: Constructed-Response (CR), Extended-Response (ER), and a Writing Prompt (WP). Item types vary by subject area. Math, Science, and Social Studies include CR and ER items. English/Language Arts includes CR and WP test questions.

Scoring

The questions on *ISTEP+ Part 1* are scored by evaluators who must have a four-year college degree and pass a series of qualifying tests. Prior to scoring student responses, evaluators receive extensive training to ensure that student responses are scored accurately and consistently.

For Part 1 of *ISTEP+*, each question is scored according to a rubric, or scoring guide. Rubrics clearly define the requirements for each score point. A set of student responses representing all of the score points on a rubric are selected as anchor papers (exemplars) and are used as clear examples of specific score points. Samples of anchor papers are presented within this document.

ISTEP+ Part 1: Mathematics		
Question Type	Score Reporting Categories	Scoring Method
Constructed-Response (CR)	Number Sense Computation Algebraic Thinking Geometry Data Analysis Mathematical Process	2-pt. CR Rubric (Grades 3-8, 10)
Extended Response (ER)	Number Sense Computation Algebraic Thinking Geometry Data Analysis Mathematical Process	4-pt. ER Rubric (Grades 3-8, 10)

If a student's response is unable to be scored, it is assigned one of the following condition codes:

- A** Blank/No Response/Refusal
- B** Illegible
- C** Written predominantly in a language other than English
- D** Insufficient response/Copied from text
- E** Response not related to test questions or scoring rule (not applied to Mathematics questions)

More information is available regarding assessment topics on the Office of Student Assessment homepage at <http://www.doe.in.gov/assessment>.

Constructed-Response Rubric

Content Rubric	
2	A score of two indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows algorithms, computations, and other content related work executed correctly and completely.
1	A score of one indicates a partial understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> contains errors in the execution of algorithms, computations, and/or other content related work.
0	A score of zero indicates limited or no understanding of the mathematical concepts embodied in the task.
Process Rubric	
2	A score of two indicates a thorough understanding of the problem-solving concepts embodied in the task. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. identifies all important elements of the problem and shows a complete understanding of the relationships among them. provides clear and complete explanations and/or interpretations when required.
1	A score of one indicates a partial understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy contains errors and/or is incomplete. identifies some of the important elements of the problem and shows a general understanding of the relationships among them. provides incomplete, partial, or unclear explanations and/or interpretations when required.
0	A score of zero indicates limited or no understanding of the problem-solving concepts embodied in the task.

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 1 point in content and a maximum of 1 point in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the “content” portion is used with an appropriate strategy to solve the problem.

Extended-Response Rubric

Content Rubric	
3	A score of three indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows algorithms, computations, and other content related work executed correctly and completely.
2	A score of two indicates a partial understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows an attempt to execute algorithms, computations, and other content related work correctly and completely; computation errors or other minor errors in the content related work may be present.
1	A score of one indicates a limited understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> contains major errors, or only a partial process. contains algorithms, computations, and other content related work which may only be partially correct.
0	A score of zero indicates no understanding of the mathematical concepts embodied in the task.
Problem-Solving Rubric	
3	A score of three indicates a thorough understanding of the problem-solving concepts embodied in the task. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. identifies all important elements of the problem and shows a complete understanding of the relationships among them. provides clear and complete explanations and/or interpretations when required.
2	A score of two indicates a partial understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy lacks an essential element. identifies some of the important elements of the problem and shows a general understanding of the relationships among them. provides incomplete or unclear explanations and/or interpretations when required.
1	A score of one indicates a limited understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy is applied incorrectly and/or is incomplete. shows a limited understanding of the relationships among the elements of the problem. provides incomplete, unclear, or omitted explanations and/or interpretations when required.
0	A score of zero indicates no understanding of the problem-solving concepts embodied in the task.

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 2 points in content and a maximum of 2 points in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the “content” portion is used with an appropriate strategy to solve the problem.

Item #1
Constructed-Response

Constructed-Response
Standard 3: Algebraic Thinking
Standard 7: Mathematical Process

Question 1

1. Mr. Green bought a package of 25 stickers. The table shows the fraction of stickers left over at the end of class on Monday and Tuesday.

	Monday	Tuesday
Fraction of Stickers Left Over Each Day	$\frac{20}{25}$	$\frac{15}{25}$

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

Answer _____

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

Exemplary Response:

- 5/25

OR

- Other equivalent response

AND

- He gives away 5/25 of all stickers each day. It will take him 3 more days to give away the remaining stickers in the package because $15/25 - 5/25 - 5/25 - 5/25 = 0$

OR

- Other valid response

AND

- Sample Process:

$$20/25 - 15/25$$

$$15/25 - 5/25 - 5/25 - 5/25 = 0$$

OR

- Other valid process

Question 1, Sample A – Algebraic Thinking Score Point 2; Process Score Point 2

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

$$\frac{20}{25} - \frac{15}{25} = \frac{5 \div 5}{25 \div 5} = \frac{1}{5}$$
$$\begin{array}{rcl} 20 - 5 & = & 15 \\ 15 - 5 & = & 10 \quad 1 \text{ day} \\ 10 - 5 & = & 5 \quad 2 \text{ days} \\ 5 - 5 & = & 0 \quad 3 \text{ days} \end{array}$$

Answer $\frac{5}{25} = \frac{1}{5}$

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

It will take 3 more days
because on Monday he gave away
5 stickers. On Tuesday he also gave
away 5 stickers. The pattern would
go on for 3 more days, and he
would have no stickers left.

Scoring Notes: The response demonstrates a thorough understanding of solving real-world problems with fractions with correct computation of fractions for Parts A and B. The response demonstrates a thorough understanding of making sense of problems and persevering in solving those problems with a correct fraction of stickers in Part A and a correct number of days in Part B. This response receives two points for content and two points for process.

Question 1, Sample B – Algebraic Thinking Score Point 2: Process Score Point 1

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

$$\frac{20}{25} - \frac{15}{25} = \frac{5}{25} = \frac{1}{5}$$

Answer $\frac{5}{25} = \frac{1}{5}$

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

Each day Mr. Green gives 5 stickers away. So
if you subtract till you get to zero. You
subtract 5 times.

Scoring Notes: The response demonstrates a thorough understanding of solving real-world problems with fractions with correct subtraction of fractions for Parts A and B. The response demonstrates a partial understanding of making sense of problems and persevering in solving those problems with a correct fraction of stickers in Part A. The response subtracts 5 stickers a day from the original number of stickers (25) instead of from the number of stickers left after Tuesday (15). This response receives two points for content and one point for process.

Question 1, Sample C – Algebraic Thinking Score Point 1; Process Score Point 2

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

$$\frac{20}{25} - \frac{15}{25} = \frac{5}{25}$$

Answer $\frac{5}{25}$

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

It will take three days after Tuesday.

Scoring Notes: The response demonstrates a partial understanding of solving real-world problems with fractions with a correct subtraction of fractions for Part A but no work showing the correct subtraction of fractions in Part B. The response demonstrates a thorough understanding of making sense of problems and persevering in solving those problems with a correct fraction of stickers in Part A and a correct number of days in Part B. This response receives one point for content and two points for process.

Question 1, Sample D – Algebraic Thinking Score Point 1; Process Score Point 0

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

$$\frac{20}{25} - \frac{15}{25} = \frac{15}{25}$$

Answer $\frac{15}{25}$

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

It would take away he only
has 15 stickers to give away.

Scoring Notes: The response demonstrates a partial understanding of solving real-world problems with fractions with a correct setup for the subtraction of fractions for Part A but no work showing the correct subtraction of fractions in Part B. The response demonstrates a limited understanding of making sense of problems and persevering in solving those problems with a calculation error in Part A and no correct number of days in Part B. This response receives one point for content and zero points for process.

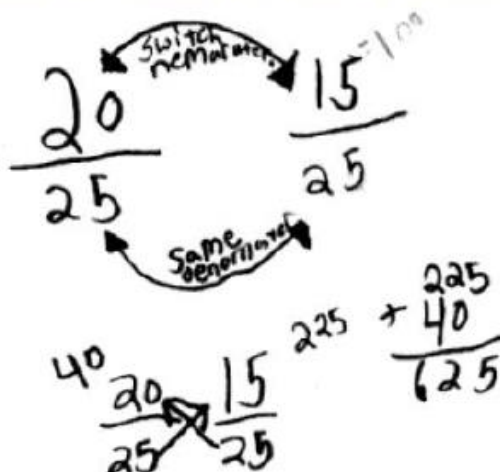
Question 1, Sample E – Algebraic Thinking Score Point 0; Process Score Point 1

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

Answer $\frac{15}{20}$



Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

It shows $\frac{20}{25}$ and $\frac{15}{25}$ so if he gives
out as much as he did last time
then in three days they will all be
gone.

Scoring Notes: The response demonstrates a limited understanding of solving real-world problems with fractions with an incorrect setup for the subtraction of fractions for Part A and no work showing the correct subtraction of fractions in Part B. The response demonstrates a partial understanding of making sense of problems and persevering in solving those problems with a correct number of days in Part B but an incorrect fraction in Part A. This response receives zero points for content and one point for process.

Question 1, Sample F – Algebraic Thinking Score Point 0; Process Score Point 0

Part A

Write a fraction to show the difference between the fraction of stickers left over on Monday and the fraction of stickers left over on Tuesday.

Show All Work

Answer $\frac{15}{20}$

Part B

Mr. Green gives away the SAME number of stickers each day.

How many days, after Tuesday, will it take for Mr. Green to give away ALL the stickers in the package? Use words, pictures, and/or symbols to explain your answer.

It will take 10 days because there are 10 stickers
left.

Scoring Notes: The response demonstrates a limited understanding of solving real-world problems with fractions with no work shown for the subtraction of fractions for Part A and no work shown for the correct subtraction of fractions in Part B. The response demonstrates a limited understanding of making sense of problems and persevering in solving those problems with an incorrect fraction in Part A and an incorrect number of days in Part B. This response receives zero points for content and zero points for process.

Item #2
Constructed-Response

Constructed-Response
Standard 2: Computation
Standard 7: Mathematical Process

Question 2

- 2.** Maria earns 9 points for completing each round in a game. On Monday she earned a total of 243 points.

Part A

How many rounds did Maria complete on Monday?

Show All Work

Answer _____ rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

Answer _____ rounds

Exemplary Response:

- 27 rounds

AND

- 310 rounds

AND

- Sample Process:

$$243 / 9 = 27$$

$$2790 / 9 = 310$$

OR

- Other valid process

Question 2, Sample A – Computation Score Point 2; Process Score Point 2

Part A

How many rounds did Maria complete on Monday?

Show All Work

$$\begin{array}{r} \times 27 \\ 9 \overline{) 243} \\ \underline{-18} \\ 63 \\ \underline{-63} \\ 0 \end{array}$$

Answer 27 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

$$\begin{array}{r} \times 310 \\ 9 \overline{) 2790} \\ \underline{-27} \\ 09 \\ \underline{-9} \\ 00 \end{array}$$

Answer 310 rounds

Scoring Notes: The response demonstrates a thorough understanding of division with a correct number of rounds in both Parts A and B. The response demonstrates a thorough understanding of thinking quantitatively by showing a valid setup in Parts A and B. This response receives two points for content and two points for process.

Question 2, Sample B – Computation Score Point 2; Process Score Point 2

Part A

How many rounds did Maria complete on Monday?

Show All Work

$$\begin{array}{r} 27 \\ 9 \overline{) 243} \\ \underline{-18} \\ 63 \\ \underline{-63} \\ 0 \end{array} \quad \begin{array}{r} 27 \\ \times 9 \\ \hline 243 \end{array}$$

Answer 27 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

$$\begin{array}{r} 310 \\ 9 \overline{) 2,790} \\ \underline{-2} \\ 09 \\ \underline{-9} \\ 00 \end{array} \quad \begin{array}{r} 310 \\ \times 9 \\ \hline 2790 \end{array}$$

Answer 310 rounds

Scoring Notes: The response demonstrates a thorough understanding of division with a correct number of rounds in both Parts A and B. The response demonstrates a thorough understanding of thinking quantitatively by showing a valid setup in Parts A and B. This response receives two points for content and two points for process.

Question 2, Sample C – Computation Score Point 1; Process Score Point 1

Part A

How many rounds did Maria complete on Monday?

[Show All Work](#)

$$\begin{array}{r} 9 \\ \times 27 \\ \hline 243 \end{array}$$

Answer 27 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

[Show All Work](#)

[illegible]

Scoring Notes: The response demonstrates a partial understanding of division with a correct number of rounds in Part A only. The response demonstrates a partial understanding of thinking quantitatively by showing a valid setup in Part A only. This response receives one point for content and one point for process.

Question 2, Sample D – Computation Score Point 1; Process Score Point 0

Part A

How many rounds did Maria complete on Monday?

Show All Work

$$9 \div 243$$

$$\begin{array}{r} 11 \\ 9 \overline{) 27} \end{array}$$

Answer 27 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

$$243 \div 2790$$

Answer 123 rounds

Scoring Notes: The response demonstrates a partial understanding of division with a correct number of rounds in Part A only. The response demonstrates a limited understanding of thinking quantitatively by showing an invalid setup and limited work in Parts A and B. This response receives one point for content and zero points for process.

Question 2, Sample E – Computation Score Point 0; Process Score Point 2

Part A

How many rounds did Maria complete on Monday?

Show All Work

$$\begin{array}{r} 29 \\ 9 \overline{) 270} \\ \underline{18} \\ 090 \\ \underline{81} \\ 090 \\ \underline{81} \\ 090 \\ \underline{81} \\ 090 \\ \underline{81} \\ 090 \end{array}$$

Answer 29 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

$$\begin{array}{r} 381 \\ 9 \overline{) 2790} \\ \underline{27} \\ 0090 \\ \underline{81} \\ 080 \\ \underline{72} \\ 10 \\ \underline{90} \\ 00 \end{array}$$

Answer 381 rounds

Scoring Notes: The response demonstrates a limited understanding of division with an incorrect number of rounds in Parts A and B based on computation errors. The response demonstrates a thorough understanding of thinking quantitatively by showing a valid setup in Parts A and B. This response receives zero points for content and two points for process.

Question 2, Sample F – Computation Score Point 0; Process Score Point 1

Part A

How many rounds did Maria complete on Monday?

Show All Work

$$\begin{array}{r} 12 \\ 9 \overline{) 243} \\ \underline{18} \\ 14 \\ \underline{9} \\ 5 \end{array}$$

Answer 12 rounds

Part B

Maria's highest score ever in this game is 2,790 points.

How many rounds did she complete to get her highest score?

Show All Work

$$\begin{array}{r} 22 \\ 12 \overline{) 2,790} \\ \underline{24} \downarrow \\ 030 \end{array}$$

Answer 22 rounds

Scoring Notes: The response demonstrates a limited understanding of division with an incorrect number of rounds in Parts A and B based on computation errors. The response demonstrates a partial understanding of thinking quantitatively by showing a valid setup in Part A, but an invalid setup in B. This response receives zero points for content and one point for process.

Item #3
Constructed-Response

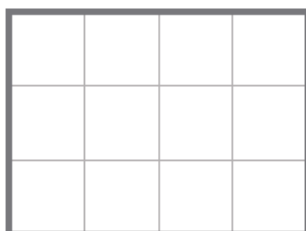
Constructed-Response
Standard 1: Number Sense
Standard 7: Mathematical Process

Question 3

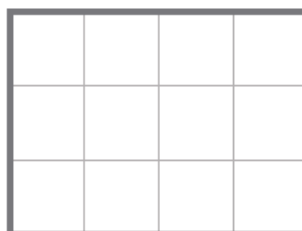
- 3.** Trevor has 12 towels. Of these towels, $\frac{1}{4}$ are blue and $\frac{2}{6}$ are green.

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

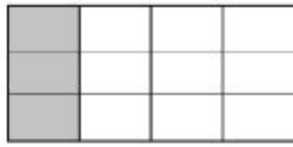
Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$$\frac{1}{4} \quad \boxed{} \quad \frac{2}{6}$$

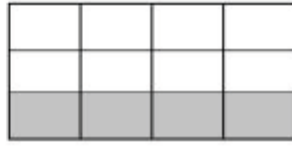
Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

Exemplary Response:



Blue Towels



Green Towels

OR

- Other valid response

AND

- There are 3 blue towels so $\frac{1}{4}$ is the same as $\frac{3}{12}$. There are 4 green towels so $\frac{2}{6}$ is the same as $\frac{4}{12}$. 3 out of 12 towels is less than 4 out of 12 towels so $\frac{1}{4} < \frac{2}{6}$.

OR

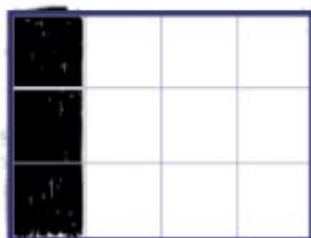
- Other valid response

Question 3, Sample A – Number Sense Point 2; Process Score Point 2

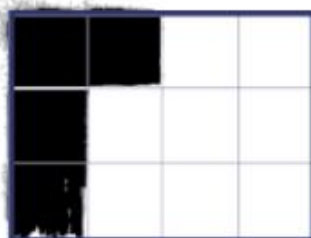
3 Trevor has 12 towels. Of these towels, $\frac{1}{4}$ are blue and $\frac{2}{6}$ are green.

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

$$\frac{1}{4} \times 3 = \frac{3}{4}$$

$$4 \times 3 = 12$$

$$\frac{2}{6} \times 2 = \frac{4}{6}$$

$$6 \times 2 = 12$$

Part B

Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$$\frac{1}{4} \boxed{<} \frac{2}{6}$$

$$6 \frac{1}{4} \times 2 = 8 \frac{2}{6}$$

Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

I know my comparison is correct because I cross
multiplied. $4 \times 1 = 4$, and $4 \times 2 = 8$. 4 is less than 8.

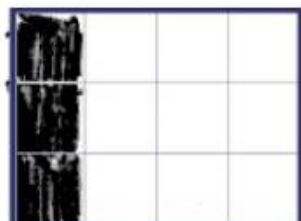
Scoring Notes: The response demonstrates a thorough understanding of comparing fractions with correct shading in Part A and the correct inequality sign in Part B. The response demonstrates a thorough understanding of reasoning quantitatively and constructing arguments with valid comparisons in Part C. This response receives two points for content and two points for process.

Question 3, Sample B – Number Sense Score Point 2; Process Score Point 0

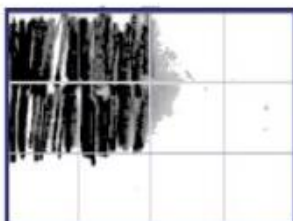
3 Trevor has 12 towels. Of these towels, $\frac{1}{4}$ are blue and $\frac{2}{6}$ are green.

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$\frac{1}{4}$ $\frac{2}{6}$

Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

✓✓✓
STAR

Green towels are greater than blue towels because $\frac{2}{6}$ is greater than $\frac{1}{4}$.

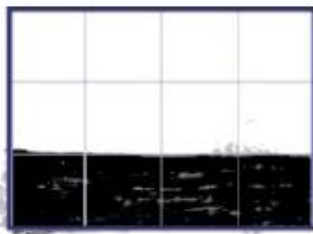
Scoring Notes: This response demonstrates a thorough understanding of comparing fractions with correct shading in Part A and the correct inequality sign in Part B. The response demonstrates a limited understanding of reasoning quantitatively and constructing arguments by not explaining how or why $\frac{2}{6}$ is greater than $\frac{1}{4}$. The response simply restated what was answered in Part B. This response receives two points for content and zero points for process.

Question 3, Sample C – Number Sense Score Point 1; Process Score Point 2

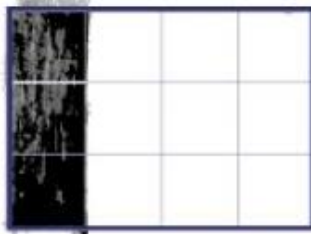
3 Trevor has 12 towels. Of these towels, $\frac{1}{4}$ are blue and $\frac{2}{6}$ are green.

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

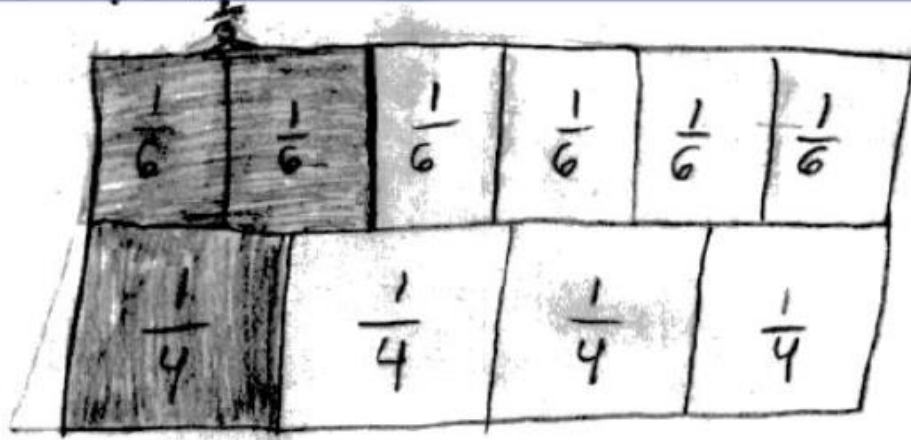
Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$$\frac{1}{4} \quad \boxed{<} \quad \frac{2}{6}$$

Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

$\frac{2}{6}$ is the same as one third and all 4th graders know that $\frac{1}{3}$ is greater than $\frac{1}{4}$, so $\frac{1}{4} < \frac{2}{6}$.

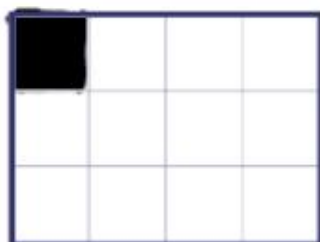


Scoring Notes: The response demonstrates a partial understanding of comparing fractions with the correct inequality sign in Part B but incorrect shading in Part A. The response demonstrates a thorough understanding of reasoning quantitatively and constructing arguments with valid comparisons in Part C. This response receives one point for content and two points for process.

Question 3, Sample D, Number Sense Score Point 1; Process Score Point 0

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$$\frac{1}{4} \quad \boxed{<} \quad \frac{2}{6}$$

Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

I know my comparison is correct because $\frac{2}{6}$ is more than $\frac{1}{4}$ or $\frac{1}{4}$ is less than $\frac{2}{6}$.

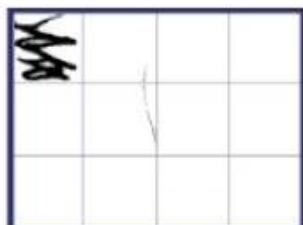
Scoring Notes: This response demonstrates a partial understanding of comparing fractions with the correct inequality sign in Part B but incorrect shading in Part A. The response demonstrates a limited understanding of reasoning quantitatively and constructing arguments by not explaining how or why $\frac{2}{6}$ is greater than $\frac{1}{4}$. The response simply restated what was answered in Part B. This response receives one point for content and zero points for process.

Question 3, Sample E – Number Sense Score Point 0; Process Score Point 0

3 Trevor has 12 towels. Of these towels, $\frac{1}{4}$ are blue and $\frac{2}{6}$ are green.

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$\frac{1}{4}$  $\frac{2}{6}$

Part C

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

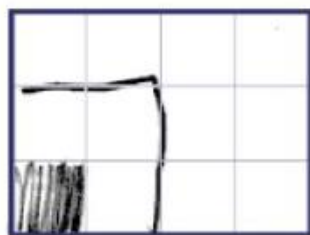
I did an LCM and $\frac{1}{4}$ equalled 3. $\frac{2}{6}$ equalled 1 so $\frac{1}{4}$ is greater than $\frac{2}{6}$

Scoring Notes: The response demonstrates a limited understanding of comparing fractions with incorrect shading in Part A and an incorrect inequality in Part B. The response demonstrates a limited understanding of reasoning quantitatively and constructing arguments with invalid comparisons in Part C. This response receives zero points for content and zero points for process.

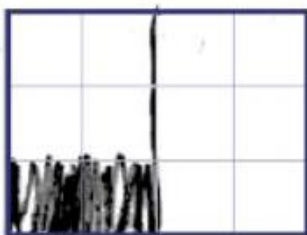
Question 3, Sample F – Number Sense Score Point 0; Process Score Point 0

Part A

Shade each grid to represent the fraction of towels that are blue and the fraction of towels that are green.



Blue Towels



Green Towels

Part B

Write $<$, $>$, or $=$ in the box to correctly compare the fraction of blue towels to the fraction of green towels.

$$\frac{1}{4} \boxed{=} \frac{2}{6}$$



Part C.

Use words, pictures, and/or symbols to explain how you know your comparison is correct.

If draw a pictures of rectangles it shows
two sixths is = to one fourths.

Scoring Notes: This response demonstrates a limited understanding of comparing fractions with incorrect shading in Part A and an incorrect inequality in Part B. The response demonstrates a limited understanding of reasoning quantitatively and constructing arguments with invalid comparisons in Part C. This response receives zero points for content and zero points for process.

Item #4
Extended-Response

Extended-Response
Standard 5: Measurement
Standard 7: Mathematical Process

Question 4

- 4.** Abby needs 6 gallons of bubble mix for a party. The bubble mix is sold in 3-quart containers. Each container costs \$4.

Part A

What is the total cost of the bubble mix Abby needs to buy?

$1 \text{ gallon} = 4 \text{ quarts}$

Show All Work

Answer \$ _____

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.

How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

Answer _____ quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

$$1 \text{ quart} = 32 \text{ ounces}$$

Show All Work

Answer _____ 8-ounce bottles

Exemplary Response:

- \$32

AND

- 12 quarts

AND

- 48 8-ounce bottles

AND

- Sample Process:

$$4 \times 6 = 24 \text{ quarts}$$

$$24/3 = 8 \text{ three-quart containers}$$

$$8 \times \$4 = \$32$$

$$24/2 = 12$$

$$32 \times 12 = 384 \text{ ounces}$$

$$384/8 = 48$$

OR

- Other valid process

Part A

1 gallon = 4 quarts

1 gallon = 4 quarts
 $\begin{array}{r} \times 6 \\ 6 \text{ gallons} = 24 \text{ quarts} \end{array}$

Answer \$ 32

Part B

[Show All Work](#)

6 gallons = 24 quarts

~~24 quarts~~

24 quarts

24

24

0

Answer 12 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

1 tub = 12 quarts = 384 oz.

$$\begin{array}{r} 32 \\ \times 12 \\ \hline 64 \\ + 320 \\ \hline 384 \text{ oz.} \end{array}$$
$$\begin{array}{r} 48 \\ 8 \overline{) 384} \\ \underline{-320} \\ 64 \\ \underline{-64} \\ 0 \end{array}$$

Answer 48 8-ounce bottles

Scoring Notes: The response demonstrates a thorough understanding of solving real-world problems involving volume by showing a valid conversion setup for Parts A, B, and C. The response demonstrates a thorough understanding of making sense of problems and persevering in solving by correctly solving Parts A, B, and C. This response receives three points for content and three points for process.

Question 4, Sample B – Measurement Score Point 3; Process Score Point 2

Part A

What is the total cost of the bubble mix Abby needs to buy?

$1 \text{ gallon} = 4 \text{ quarts}$

Show All Work

$$\begin{aligned} 8 \times 3 &= 24 \text{ quart} = 6 \text{ gallons} \\ 8 \times 4 &= 32 \$ \end{aligned}$$

Answer \$ 32

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.

How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$\begin{array}{r} 24 \\ 12 \\ \hline 12 \end{array} \text{ quarts}$$
$$\begin{array}{r} 12 \\ +12 \\ \hline 24 \end{array}$$

Answer 12 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

12
Show All Work

$$\begin{array}{r} 12 \\ \times 32 \\ \hline 24 \\ 360 \\ \hline 384 \end{array}$$

Answer 384 8-ounce bottles

Scoring Notes: The response demonstrates a thorough understanding of solving real-world problems involving volume by showing a valid conversion setup for Parts A, B, and C. The response demonstrates a partial understanding of making sense of problems and persevering in solving by correctly solving Parts A and B. The response finds the number of total ounces in Part C, not the number of 8-ounce bottles. This response receives three points for content and two points for process.

Question 4, Sample C – Measurement Score Point 2; Process Score Point 2

Part A

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

$$6 \text{ gallons } 24 \text{ q.} \quad 4 \times 6 = 24 \quad 8 \times 4 = 32 \quad 18 \div 3 = 6 \quad 3 \times 8 = 24$$

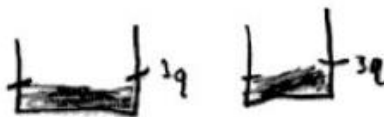
Answer \$ 32

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.
How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$6 \div 2 = 3$$



Answer 3 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

$$32 \times 8 = 12$$

$$32 \div 4 = 8$$

$$\begin{array}{r} 12 \\ 8 \overline{) 96} \\ \underline{8} \\ 16 \\ \underline{16} \\ 0 \end{array}$$

$$\begin{array}{r} 32 \\ \times 33 \\ \hline 96 \end{array}$$

Answer 12 8-ounce bottles

Scoring Notes: The response demonstrates a partial understanding of solving real-world problems involving volume by showing a valid conversion setup for Parts A and C only. The response demonstrates a partial understanding of making sense of problems and persevering in solving by correctly solving Parts A and C. Part C is acceptable for both content and process since the incorrect response from Part B (3 quarts) was correctly applied and carried through to find the correct number of 8-ounce bottles based on 3 quarts. This response receives two points for content and two points for process.

Question 4, Sample D – Measurement Score Point 2; Process Score Point 1

Part A

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

$$\begin{array}{r} 18 \\ \times 4 \\ \hline 72 \end{array}$$

$$6 \times 3 = 18 \text{ quarts}$$

Answer \$ 72

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.
How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$6 \times 4 = 24 \div 2 = 12$$

Answer 12 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

$$\begin{array}{r} 12 \overline{) 384} \\ \underline{24} \\ 368 \\ \underline{368} \\ 0 \end{array}$$

384 8 ounce bottles

Answer 384 8-ounce bottles

Scoring Notes: The response demonstrates a partial understanding of solving real-world problems involving volume by showing a valid conversion setup for Parts B and C. The response demonstrates a limited understanding of making sense of problems and persevering in solving by correctly solving Part B only. This response receives two points for content and one point for process.

Question 4, Sample E – Measurement Score Point 1; Process Score Point 2

Part A

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

$$8 \times 3 = 24$$

$$8 \times 4 = 32$$

Answer \$ 32

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.
How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$\begin{array}{r} 3 \\ 2 \overline{) 6} \\ \underline{-6} \\ 0 \end{array}$$

Answer 3 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

$$\begin{array}{r} 32 \\ \times 3 \\ \hline 96 \end{array}$$

$$\begin{array}{r} 12 \\ 8 \overline{)96} \\ \underline{8} \\ 16 \\ \underline{16} \\ 0 \end{array}$$

Answer 12 8-ounce bottles

Scoring Notes: The response demonstrates a limited understanding of solving real-world problems involving volume by showing a valid conversion setup for Part C only. The response demonstrates a partial understanding of making sense of problems and persevering in solving by correctly solving Parts A and C. Part C is acceptable for both content and process since the incorrect response from Part B (3 quarts) was correctly applied and carried through to find the correct number of 8-ounce bottles based on 3 quarts. This response receives one point for content and two points for process.

Question 4, Sample F – Measurement Score Point 1; Process Score Point 0

Part A

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

$$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$$

Answer \$ 18

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.

How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$\begin{array}{r} 3 \\ 2 \overline{)6} \\ \underline{6} \\ 0 \end{array}$$

Answer 3 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

$$\begin{array}{r} 32 \\ \times 3 \\ \hline 96 \end{array}$$

Answer 96 8-ounce bottles

Scoring Notes: The response demonstrates a limited understanding of solving real-world problems involving volume by showing a valid conversion setup for Part C only. The response demonstrates a limited or no understanding of making sense of problems and persevering in solving by incorrectly solving Parts A, B, and C. Part C is acceptable for content since the incorrect response from Part B (3 quarts) was correctly applied to find the number of ounces in 3 quarts. This response receives one point for content and zero points for process.

Question 4, Sample G – Measurement Score Point 0; Process Score Point 2

Part A

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

$$\begin{array}{r} 10 \\ \times 9 \\ \hline 90 \end{array}$$

Answer \$ 96 mix

$$\begin{array}{r} 10 \text{ gallons} \\ 2 \text{ gallons} \\ \hline 12 \text{ gallons} \\ 12 \text{ gallons} \times 4 \text{ quarts} = 48 \text{ quarts} \\ 48 \text{ quarts} \div 2 = 24 \text{ quarts} \end{array}$$

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.
How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$12 \text{ quarts}$$

Answer 24 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

2 R2

Show All Work

$$\begin{array}{r} 15 \overline{) 32} \end{array}$$

$$\begin{array}{r} 8 \overline{) 64} \end{array}$$

Answer 48 8-ounce bottles



Scoring Notes: The response demonstrates limited or no understanding of solving real-world problems involving volume by showing invalid conversion setups for Parts A, B, and C. The response demonstrates a partial understanding of making sense of problems and persevering in solving by correctly solving Parts B and C. This response receives zero points for content and two points for process.

Question 4, Sample H – Measurement Score Point 0; Process Score Point 0

Part A

$$6 \div 3 = 2$$

What is the total cost of the bubble mix Abby needs to buy?

1 gallon = 4 quarts

Show All Work

Answer \$ \$2

Part B

Abby buys 6 gallons of bubble mix and pours it equally into 2 tubs.
How many QUARTS of bubble mix does Abby pour into each tub?

Show All Work

$$6 \div 2 =$$



Answer 3 quarts

Part C

Abby fills 8-ounce bottles with the bubble mix from 1 of the tubs.

What is the GREATEST number of 8-ounce bottles that can be filled with bubble mix from 1 of the tubs?

1 quart = 32 ounces

Show All Work

$$\begin{array}{r} 32 \\ + 32 \\ \hline 64 \end{array}$$

Answer 64 8-ounce bottles

Scoring Notes: The response demonstrates limited or no understanding of solving real-world problems involving volume by showing invalid conversion setups for Parts A, B, and C. The response demonstrates limited or no understanding of making sense of problems and persevering in solving with incorrect responses in Parts A, B, and C. This response receives zero points for content and zero points for process.